

On the Fecundity of the Bogue, *Boops boops* (Linnaeus, 1758), from the Northern Sicilian Coast (Central Mediterranean)

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Abstract

In this study the fecundity of the bogue (*Boops boops*) from the northern Sicilian coast (Central Mediterranean) was assessed by volumetric method. During the spawning season 46 fully mature females *B. boops* were sampled in the Harbour of Milazzo (South Tyrrhenian Sea). The relationships between absolute fecundity, fish weight and length were evaluated.

Keywords: Spawning; Northern sicilian coast; Fecundity

Introduction

The bogue, *Boops boops* [1], is a teleost belonging to the Sparidae family. This species lives in the eastern Atlantic, from Norway to Angola, and throughout the Mediterranean Sea, including the Black Sea [2]. The bogue is a medium sized demersal and semipelagic species that inhabits all types of sea bottoms until 350 m. Signs of a general decline in bogue standing stock have already been recorded by Matta et al. [3] for the Mediterranean Sea and by Mennes et al. [4] for the western Sahara region.

The assessment of fecundity is a fundamental topic in the study of biology and population dynamics, especially when density-dependent changes (i.e. increased fecundity with decreased density) might be expected in case of high exploitation [5]. In this study the fecundity of the bogue from the northern Sicilian coast (Central Mediterranean) was assessed by volumetric method.

Materials and Methods

During the spawning season 46 fully mature females *B. boops* were sampled in the Harbour of Milazzo (southern Tyrrhenian Sea, 38°13.569N-15°14.232E). The following individual measurements were recorded: total length (TL; to the nearest lower mm), total (TW; 0.01 g), total without gonads (WW; 0.01 g) weight and gonad weight (GW; 0.01 g). Both absolute (F_a) and relative (Fr) fecundities were estimated according to Murua et al. [6]. The F_a , as number of mature oocytes spawned by a female in a single spawning, was calculated according to the formula $F_a = GW \times NO_g$, where NO_g denotes the number of mature oocytes per g of ovarian tissue. The Fr was estimated as the number of mature oocytes per gram of WW [7]. The relationships between absolute fecundity (F_a) and total without gonads weight (WW) and total length (TL) were evaluated by three regression models: simple linear, power and exponential; the 2nd and 3rd after nonlinear regression method. The goodness of fit was evaluated on the base of residual analysis, the coefficient of determination (R^2) and the

corrected Akaike's information criterion (AICc). The best model was then chosen according to the minimum AICc (Table 1).

Equation	R ²	AIC _c
$F_a = 1268 * TL - 190236$	0.84	901.3
$F_a = 0.001 * TL^{3.3693}$	0.86	892.5
$F_a = 2547 e^{0.0153TL}$	0.85	897.3
$F_a = 728S * WW - 4775$	0.85	899.2
$F_a = 686 S * WW^{1.0197}$	0.84	900.5
$F_a = 28549 e^{0.00082WW}$	0.75	927.2

Table 1: Relationship between absolute fecundity (F_a) and total length (TL) and without gonad weight (WW) of *Boops boops*. R²: coefficient of determination AICc: Akaike's information criterion corrected. The selected model is indicated in bold.

Results, Discussion and Conclusion

Absolute fecundity (F_a) ranged from 14,951 (152 mm TL; 32.2 g TW) to 282,680 (287 mm TL; 290 g TW) eggs. The mean value (\pm standard deviation, sd) for F_a was $94,263 \pm 59,731$ corresponding to a mean TL of 222 ± 39 mm (152-295 mm), a mean TW of 128 ± 76 g (32.2-295.5 g) and a mean GW of $(7 \pm 6g)$ (0.8-24.7g). Based on WW, the relative fecundity (Fr) ranged from 420 to 1153 number of mature eggs/g, with a mean of 779 ± 189 . The relationships between F_a and WW and between F_a and TL were best described by simple linear and power equations, respectively (Table 1).

The estimates reported in this study (the first for the western Mediterranean Sea) should be considered as potential annual minimum values for the presence, during the spawning period, of oocytes at different stages of development [8-10]. The results of this study support available information for other Mediterranean stocks (Table 2).

FAO Major Fishing Area	GSA	min F_a	max F_a	Size range (TL, mm)	References
27 Northeast Atlantic	-	11550	357800	140-360	Gordo et al. [8]
37 Mediterranean and Black Sea	10 South Tyrrhenian Sea	14951	282680	152-287	Present study
37 Mediterranean and Black Sea	22 Aegean Sea	33072	66123	199-276	Taylan et al. [1]
37 Mediterranean and Black Sea	26 South Levant	1296	53071	106-208	El-Agamy et al. [10]

GSA: geographical subarea; F_a : absolute fecundity; TL: total length

Table 2: Minimum and maximum fecundity of *Boops boops* in the Mediterranean Sea and Atlantic ocean.

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